O2: Tetsuya Hama

Institute of Low Temperature Science, Hokkaido University, Sapporo 060-0819, Japan

Tunneling $H$ addition to benzene and its control via surface structure

This talk shows that the amorphous or crystalline structure of a solid benzene surface controls its chemical reactivity toward hydrogen. In situ infrared reflection-absorption spectroscopy revealed that $H$ atoms can add to an amorphous benzene surface to form cyclohexane by quantum tunneling. However, hydrogenation is greatly reduced on crystalline benzene. We suggest that the origin of the high selectivity of this reaction is the large difference in intermolecular steric hindrance between the amorphous and the crystalline surfaces.

O3: Manuel Domingo; Ramón Luna; Carlos Millán; Carmina Santonja and Miguel Ángel Satorre

Escuela Politécnica Superior de Alcoy, UPV, 03801 Alicante, Spain

Experimental studies of density and refractive index for astrophysical ices

The talk will describe how density and refractive index are determined, in our laboratory, by means of double laser interferometry and quartz crystal microbalance (QCMB) techniques.

Some results will be shown to relate these parameters with values used in astrophysics or spectroscopy (i.e. band strength, optical constants, etc.) and to show the relationship of them with the structure of ices (i.e. crystalline-amorphous structure, porosity, etc.).

P3: Víctor José Herrero

Instituto de Estructura de la Materia (IEM-CSIC), Madrid, Spain

Laboratory astrophysics at IEM: overview of recent results

The activity of the Laboratory Astrophysics group at IEM will be illustrated with representative examples from its main research lines. The results reviewed will deal with molecules ($CO_2, CH_4$) and ions ($NH_3^+, HCOO^-$) in ice, as well as with ion-molecule chemistry leading to $H_3^+, N_2H^+, NH_4^+$ and $ArH^+$ in hydrogen-rich cold
plasmas. Both experimental measurements and theoretical calculations will be presented.

O4: Hiroshi Hidaka¹, Yoshiaki Sugimoto², Syunichi Nakatubo¹, Naoki Watanabe¹, Akira Kouchi¹

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Observation of amorphous solid water by non-contact atomic force microscopy

Amorphous solid water (ASW) is abundant material of interstellar ice and is mainly present so as to cover the interstellar dust grains which are mineral particles with sub-micron size. Morphology of ASW is known to affect the physical and chemical phenomena occurring on ASW. However, the morphology of ASW in nano-scale range depending on the growth conditions is still unknown. Recently, we performed the real-space observations of surface structure of ASW formed by the oblique and the background vapor deposition method by using atomic force microscopy at several temperatures. In our presentation, the temperature and the deposition method dependence of surface morphology of ASW will be presented.

O5: Vicente Timón

Instituto de Estructura de la Materia (IEM-CSIC), Madrid, Spain

Theoretical calculations on HACs

Cosmic carbonaceous nanoparticles present in the interstellar medium are a very important component of interstellar dust as hydrocarbon polymers. In fact a large amount of interstellar carbon is locked into polycyclic aromatic hydrocarbons and carbonaceous dust grains. The composition of these grains is believed to be similar to that of hydrogenated amorphous carbon (HAC), which is a complex disordered form of carbon consisting of diamond-like sp³ and graphite-like sp² bonded carbon that can exhibit diverse properties depending on its formation conditions. A usual way of preparing HAC films in our laboratory is through plasma enhanced chemical vapor deposition (PECVD) of suitable gas precursors. Small hydrocarbons (CH₄, C₂H₂) reproduce reasonable well the main absorption bands of interstellar carbonaceous dust.